Applied Magnetic Resonance 1997 vol.12 N4, pages 517-527

New hole configurations in X-irradiated KTiOPO4 crystals

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Abstract

Electron paramagnetic resonance has been used to study the structure and thermostability of oxygen hole centers produced in KTiOPO4 (KTP) crystals X-irradiated at 77 K. During the annealing of KTP crystals above 160 K the redistribution of charges took place. Four hole centers were observed at 40 K after the heating of the X-irradiated KTP crystal at different temperatures. The intensity of the hole center 1 decreased and new hole configurations (center 2 and center 3) appeared in the crystals. The g-matrices were obtained from the angular dependencies of EPR spectra. The principal g-values for center 1 were 2.0040, 2.0209, and 2.0437. The principal g-values for centers 2 and 3 were 2.0053, 2.0204, 2.0431 and 2.0035, 2.0183, 2.0628, respectively. The transformation of Ti3+ spectra indicated that the trivalent titanium ions were involved into the recombination process. Subsequent annealing at temperatures above 220 K led to the formation of a new hole center 4 (ga = 2.0213, gb = 2.0236, gc = 2.0370).